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EXAMINER	
GANDHI, DIPAKKUMAR B	

ART UNIT	PAPER NUMBER
2133	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/817,731	PERSSON ET AL.
	Examiner	Art Unit
	Dipakkumar Gandhi	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) *4 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-20 and 22-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

1. Applicants' request for reconsideration filed on 6/17/2004 has been reviewed.

2. Amendment filed on 6/17/2004 has been entered.

3. Applicants' arguments filed on 6/17/2004 have been fully considered but they are moot in view of the new ground(s) of rejection.

Oath/Declaration

4. A new oath or declaration is required because the second inventor has not signed and dated the oath/declaration.

Claim Objections

5. Claim 1 is objected to because of the following informalities:

- On page 2, line 2 of claim 1, "the wireless communication link" is incorrect. It should be – a wireless communication link--. Appropriate correction is required.
- On page 2, line 4 of claim 1, "and/or frequency domains" is incorrect. It should be –and frequency domains--. Appropriate correction is required.
- On page 2, line 8 of claim 1, "provides" is incorrect. It should be –provide--. Appropriate correction is required.

6. Claim 2 is objected to because of the following informalities: On page 2, line 4 of claim 2; "a wireless communication link" is incorrect. It should be - the wireless communication link-. Appropriate correction is required.

7. Claim 7 is objected to because of the following informalities: On page 3, line 2 of claim 7, "repetition-coded signal" is incorrect; as claim 7 is dependent of claim 5 and in claim 5, repetition-coded signal is not mentioned. Appropriate correction is required.

8. Claim 22 is objected to because of the following informalities:

- On page 6, line 4 of claim 22, "each generate" is incorrect. It should be –each generates-. Appropriate correction is required.
- On page 6, lines 7-8 of claim 22, "channel processor(s) perform additional processing and to route the signals" is incorrect. It should be – channel processor(s), performs additional

processing, and said second stage channel processor routes the signals-. Appropriate correction is required.

9. Claims 35 and 39 objected to because of the following informalities: Indentation is required. Appropriate correction is required.

10. Claim 41 is objected to because of the following informalities: On page 9, line 7 of claim 41; "demodulating combined" is incorrect. It should be –demodulating the combined-. Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

12. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. "A weak link component" is not defined in claim 1.

13. Claim 41 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. "A dimension of signal diversity" and "the determined wireless communication link" are not defined in claim 41.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. Claims 1, 16, 22, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) in view of Altman et al. (US 3,195,049).

As per claim 1, Magnuski teaches a method comprising: detecting a weak link component in the wireless communication link; introducing a diversity, into at least the weak link component in response to detecting the weak link to generate a plurality of decorrelated signals associated with the weak link component; and selectively combining received ones of the plurality of decorrelated signals which, when demodulated, provides a representation of content originally transmitted in the received signal(s), (figure 3, col. 2, lines 13-21, col. 3, line 60-col. 4, line 17, Magnuski).

However Magnuski does not explicitly teach the specific use of a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains.

Altman et al. in an analogous art teach that this invention relates to radio diversity receiving systems and more particularly to space, frequency, time and angle diversity radio reception of angularly modulated carrier waves ....to obtain a single combined signal at baseband (col. 1, line 11-col. 2, line 2, Altman et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Altman et al. by including an additional step of using a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains would provide the opportunity to reduce signal fading at the receiving system.

- As per claim 16, Magnuski and Altman et al. teach the additional limitations.

Claim 16 follows the same limitations as claim 1. See rejection to claim 1, above. Claim 16 is rejected under the same rational as to claim 1 rejected above.

- As per claim 22, Magnuski and Altman et al. teach the additional limitations.

Altman et al. teach a wireless communication system element, the transceiver comprising: a plurality of first stage channel processors, each associated with a communication channel, wherein each generate a spatial composite signal from a plurality of spatially decorrelated signal(s) received from one or more antenna(s) coupled to the system element; and at least one second stage channel processor, coupled to the first stage channel processors to receive at least the spatial composite signal from each of the first stage channel processor(s) perform additional processing and to route the signals to appropriate other network elements to facilitate the communication session (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

- As per claim 41, Magnuski and Altman et al. teach the additional limitations.

Magnuski teaches a method comprising: determining that an effective signal strength of a signal on a Wireless communication link using a dimension of signal diversity is insufficient to provide a desired communication range; introducing an additional signal diversity into the determined wireless communication link to generate multiple decorrelated signals corresponding to signal on the wireless communication link; and selectively combining the decorrelated signals and demodulating combined, decorrelated signals to generate a representation of the content of the signal (figure 3, col. 2, lines 13-21, col. 3, line 60-col. 4, line 17, Magnuski).

Altman et al. teach an additional dimension of signal diversity (col. 1, line 11-col. 2, line 2, Altman et al.).

17. Claims 2, 17, 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) and Altman et al. (US 3,195,049) as applied to claim 1 above, and further in view of Soliman (US 2002/0114288 A1).

As per claim 2, Magnuski and Altman et al. substantially teach the claimed invention described in claim 1 (as rejected above).

However Magnuski and Altman et al. do not explicitly teach the specific use of a method, wherein detecting a weak link component comprises: monitoring one or more operational characteristics of each

of an uplink and downlink component of a wireless communication link; and comparing the monitored characteristic(s) against a threshold associated with each of the one or more characteristics.

Soliman in an analogous art teaches that this invention relates to digital wireless communication systems, and more particularly to methods for detecting forward and reverse link imbalances in digital wireless communications systems (page 1, paragraph 2, Soliman).

Wireless units typically communicate with base stations using a duplexing scheme that allows for the exchange of information in both directions of connection. Transmissions from a base station to a wireless unit are commonly referred to as "downlink" transmissions. Transmissions from a wireless unit to a base station are commonly referred to as "uplink" transmissions. In CDMA and FDMA communication systems, the downlink is commonly referred as the "forward" link and the uplink is commonly referred to as the "reverse" link. A well-known problem in cellular communication systems is system performance degradation caused by signal strength imbalances in the forward and reverse links. To mitigate this problem, cellular communication system designers attempt to ensure that signal path losses tolerated by the reverse links is equal to or approximately equal to those tolerated by the forward links. One important design objective is to balance the forward and reverse links. Unfortunately, due to dynamically changing network conditions such as system loading, antenna pattern mismatches, differences in antenna gains, and other channel variations, imbalances still occur. In cellular communication systems such as CDMA and FDMA, forward and reverse link imbalances often cause degraded system performance (page 1, paragraph 5, Soliman).

The present invention is a novel method and apparatus for detecting forward and reverse link imbalances in a digital cellular communication system and for processing calls accordingly. The present invention improves call delivery rates in a digital cellular communication system by detecting forward and reverse link imbalances, determining which link is weaker, and processing calls in accordance with the determination. The present invention improves system performance by determining whether in-progress calls are dropped due to link imbalance conditions. If so, the present invention takes corrective action during subsequent system accesses (page 3-4, paragraph 28, Soliman).

Soliman also teaches that the link imbalance detection method of claim 11, wherein the predetermined threshold value is -100 dBm in CDMA systems, and wherein the predetermined threshold value is -103 dBm in PCS systems. The link imbalance detection method of claim 11, wherein the predetermined threshold value is dependent upon a link budget associated with the communication link between the wireless unit and the first base station (page 10, claims 15-16, Soliman).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Soliman by including an additional step of using a method, wherein detecting a weak link component comprises: monitoring one or more operational characteristics of each of an uplink and downlink component of a wireless communication link; and comparing the monitored characteristic(s) against a threshold associated with each of the one or more characteristics.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the weak link in the wireless communication system and to implement techniques to improve data rate of the wireless communication system.

- As per claim 17, Magnuski, Altman et al. and Soliman teach the additional limitations.

Soliman teaches that the system element is a communication station, and the different element is a subscriber unit (page 1, paragraph 4, Soliman).

- As per claim 18, Magnuski, Altman et al. and Soliman teach the additional limitations.

Soliman teaches that the system element is a subscriber unit, and the different element is a communication station (page 4, paragraph 30, Soliman).

- As per claim 19, Magnuski and Altman et al. and Soliman teach the additional limitations.

Claim 19 follows the same limitations as claim 2. See rejection to claim 2, above. Claim 19 is rejected under the same rational as to claim 2 rejected above.

18. Claims 3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049) and Soliman (US 2002/0114288 A1) as applied to claim 2 and

19 above, and further in view of and further in view of Molloy et al. (US 6,591,382 B1) and Agrawal et al. (US 5,722,051).

As per claim 3, Magnuski, Altman et al. and Soliman substantially teach the claimed invention described in claim 2 and 19 (as rejected above). Soliman also teaches a receive signal strength (page 1, paragraph 5, page 3, paragraph 24, page 4, paragraph 29, Soliman) and a signal to noise ratio (SNR), page 7, paragraphs 63, 66, Soliman.

However Magnuski, Altman et al. and Soliman do not explicitly teach specifically that the monitored one or more operational characteristics include a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

Molloy et al. in an analogous art teach that during data communications, a quality of service monitor constantly monitors the signal quality, via a signal quality indicator (col. 3, lines 7-9, Molloy et al.). Molloy et al. teach that the quality indicator is used to track the bit error rate of data transmissions (col. 9, lines 11-12, Molloy et al.). Molloy et al. teach Signal-to-Noise-and-Interference-Ratio, SINR (col. 9, lines 33-34, Molloy et al.). Molloy et al. teach that if the measured FER is much larger than a projected FER based on the average signal level, then interference is probably present (col. 9, lines 60-63, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Molloy et al. by including an additional step of monitoring one or more operational characteristics that include a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

Magnuski, Altman et al. and Soliman also do not explicitly teach specifically a carrier to interference ratio (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

- Claim 20 follows the same limitations as claim 3. See rejection to claim 3, above. Claim 20 is rejected under the same rational as to claim 3 rejected above.

19. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) and Altman et al. (US 3,195,049) as applied to claim 1 above, and further in view of Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1).

As per claim 5, Magnuski and Altman et al. substantially teach the claimed invention described in claim 1 (as rejected above).

However Magnuski and Altman et al. do not explicitly teach the specific use of determining whether an additional channel is available.

Chuang et al. in an analogous art teach that FIG. 2 shows a flow diagram of a process for scanning for available channels performed by a wireless station according to the present invention (figure 2, col. 7, lines 18-20, Chuang et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Chuang et al. by including an additional step of determining whether an additional channel is available.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to use diversity techniques to improve the data rate for the communication link.

Magnuski and Altman et al. also do not explicitly teach the specific use of invoking repetition coding in at least the weak link component to provide channel diversity.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding in at least the weak link component to provide channel diversity.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 6, Magnuski and Altman et al. Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach that a channel is a timeslot on a particular carrier frequency (col. 8, lines 37-39, Chuang et al.).

- As per claim 7, Magnuski and Altman et al. Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach introducing frequency diversity in the signal, wherein each timeslot is dynamically assigned to an independent carrier frequency (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.). Schuster et al. teach repetition-coded signal (col. 4, lines 20-26, Schuster et al.).

- As per claim 8, Magnuski, Altman et al., Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach determining whether an additional channel is available comprises determining whether a timeslot is available (figure 2, col. 7, lines 18-20, col. 8, lines 37-39, Chuang et al.). Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

- As per claim 9, Magnuski, Altman et al. Chuang et al. and Schuster et al. teach the additional limitations.

Chuang et al. teach multiple channels (col. 8, lines 44-47, Chuang et al.). Altman et al. teach multiple receive paths (col. 1, lines 11-15, Altman et al.). Magnuski teaches enabling receipt of the weak link component (col. 3, lines 68-73, Magnuski).

- As per claim 10, Magnuski, Altman et al., Chuang et al. and Schuster et al. teach the additional limitations.

Altman et al. teach that enabling receipt via multiple receive paths comprises: receiving through multiple antennae (col. 1, lines 28-32, Altman et al.). Magnuski teaches the weak link component (col. 1, lines 29-32, Magnuski).

20. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Chuang et al. (US 6,052,594) and Schuster et al. (US 6,170,075 B1) as applied to claim 9 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 11, Magnuski, Altman et al., Chuang et al. and Schuster et al. substantially teach the claimed invention described in claim 9 (as rejected above). Altman et al. also teach performing initial spatial processing on at least a temporally first channel by adding energy of each of the signals associated with the channel via the multiple receive paths to form a composite of such signals and combining spatially processed composite signals associated with each of the channels (col. 1, lines 28-47, Altman et al.).

Magnuski also teaches the weak link component (col. 1, lines 29-32, Magnuski).

Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

However Magnuski, Altman et al., Chuang et al. and Schuster et al. do not explicitly teach the specific use of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Balachandran et al. by including an additional step of performing an error control check on the composite signal and determining if the error control check on the composite signal fails.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error control check on the composite signal and determining if the error control check on the composite signal fails would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

- As per claim 13, Magnuski, Altman et al., Chuang et al., Schuster et al. and Balachandran et al. teach the additional limitations.

Altman et al. teach demodulating the composite signal (col. 1, lines 41-45, Altman et al.).

Balachandran et al. teach extracting error control information from at least a subset of the demodulated signal (col. 1, lines 65-67, col. 2, line 1, col. 10, lines 8-10, Balachandran et al.).

Balachandran et al. teach performing a cyclical redundancy check (CRC) using the error control information to determine whether the demodulated signal matches an originally encoded signal (figure 5, col. 10, lines 8-10, lines 29-31, Balachandran et al.).

21. Claims 12, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Chuang et al. (US 6,052,594), Schuster et al. (US 6,170,075 B1) and Balachandran et al. (US 5,881,105) as applied to claim 11 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 12, Magnuski, Altman et al., Chuang et al., Schuster et al. and Balachandran et al. substantially teach the claimed invention described in claim 11 (as rejected above). Altman also teaches combining each spatially diverse signal representation of the channel received from the multiple receive paths (col. 1, lines 28-47, Altman).

However Magnuski, Altman et al., Chuang et al., Schuster et al. and Balachandran et al. do not explicitly teach the specific use of utilizing maximal ratio combining (MRC).

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

- As per claim 14, Magnuski, Altman et al., Chuang et al., Schuster et al. and Balachandran et al. and Chin et al. teach the additional limitations.

Altman et al. teach combining spatially processed composite signals comprises: receiving each of the spatially processed composite signals associated with each channel and combining the spatially composite signals (col. 1, lines 28-47, Altman).

Magnuski teaches the weak link component (col. 1, lines 29-32, Magnuski).

Schuster et al. teach repetition coding (col. 4, lines 20-26, Schuster et al.).

Chin et al. teach utilizing maximal ratio combining (MRC) to generate a best estimate of the signal transmitted (col. 3, lines 2-5, Chin et al.).

22. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) and Altman et al. (US 3,195,049), as applied to claim 1 above, and further in view of Tolopka et al. (US 6,044,349).

As per claim 15, Magnuski and Altman et al. substantially teach the claimed invention described in claim 1 (as rejected above).

However Magnuski and Altman et al. do not explicitly teach the specific use of a storage medium comprising a plurality of machine executable instructions which, when executed, implement a method.

Tolopka et al. in an analogous art teach a machine readable storage medium having stored thereon machine executable instructions, wherein execution of the machine-executable instructions is to implement a method (col. 10, lines 36-39, Tolopka et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Tolopka et al. by including an additional step of using a storage medium comprising a plurality of machine executable instructions which, when executed, implement a method.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a storage medium comprising a plurality of machine executable instructions, which when executed, implement a method would provide the opportunity to automate the method and the method will be implemented faster and accurately.

23. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) and Altman et al. (US 3,195,049) as applied to claim 22 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 23, Magnuski and Altman et al. substantially teach the claimed invention described in claim 22 (as rejected above). Altman et al. also teach that spatial processing of the received spatially diverse signals to generate a spatial composite of such received signals (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

However Magnuski and Altman et al. do not explicitly teach the specific use of maximal ratio combining (MRC).

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

24. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) and Altman et al. (US 3,195,049) as applied to claim 22 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 24, Magnuski and Altman et al. substantially teach the claimed invention described in claim 22 (as rejected above). Altman et al. also teach that the first stage processors demodulate the spatial composite signal (col. 1, lines 43-45, Altman et al.).

However Magnuski and Altman et al. do not explicitly teach the specific use of performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Balachandran et al. by including an additional step of performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that performing an error check, wherein a positive error check denotes that the transmitted signal has been accurately received would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

- As per claim 25, Magnuski and Altman et al. and Balachandran et al. teach the additional limitations.

Magnuski teaches that the diversity agent introduces channel diversity in one or more of the wireless communication links if a weak link component is identified (col. 3, lines 60-70, Magnuski).

25. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049) and Balachandran et al. (US 5,881,105) as applied to claim 25 above, and further in view of Schuster et al. (US 6,170,075 B1).

As per claim 26, Magnuski, Altman et al. and Balachandran et al. substantially teach the claimed invention described in claim 25 (as rejected above).

Magnuski teaches the weak link component, diversity agent and providing temporally diverse signals (col. 3, lines 60-70, Magnuski).

However Magnuski, Altman et al. and Balachandran et al. do not explicitly teach the specific use of invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels.

However Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that invoking repetition coding in at least a transmitter of the weak link component to redundantly transmit conversational content on at least two channels would provide the opportunity to improve the data rate over the wireless channel and improve the quality of wireless communications.

26. Claims 27-29, 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Balachandran et al. (US 5,881,105), and Schuster et al. (US 6,170,075 B1) as applied to claim 26 above, and further in view of Chuang et al. (US 6,052,594).

As per claim 27, Magnuski, Altman et al., Balachandran et al. and Schuster et al. substantially teach the claimed invention described in claim 26 (as rejected above).

However Magnuski, Altman et al., Balachandran et al. and Schuster et al. do not explicitly teach the specific use of a channel defined as a timeslot-frequency pair.

Chuang et al. in an analogous art teach that a channel is defined to be a particular timeslot of a particular carrier frequency and is designated as (timeslot, carrier frequency), col. 8, lines 37-39, Chuang et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Chuang et al. by including an additional step of using a channel defined as a timeslot-frequency pair.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a channel defined as a timeslot-frequency pair would provide the opportunity to implement diversity techniques for reliable wireless communications using multiple channels.

- As per claim 28, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Altman et al. teach that diversity agent instructs the second stage channel processor to forward the spatial composite signal from a temporally first channel processor to a subsequent channel processor for further processing on the spatial composite signals (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

Magnuski teaches the weak link component (col. 3, lines 60-62, Magnuski).

- As per claim 29, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Altman et al. teach that the subsequent channel processor combines its spatial composite signal with a temporally diverse spatial composite received from the temporally first channel processor via the second stage channel processor (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

- As per claim 31, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Chuang et al. teach that each of the channels is dynamically assigned to an independent carrier frequency, providing frequency diverse signals (col. 7, lines 48-49, col. 8, lines 37-39, Chuang et al.).

- As per claim 32, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Altman et al. teach that diversity agent instructs each of channel processor to submit its spatial composite signal to the second stage channel processor, which combines the spatial composite from the temporally first channel processor with temporally diverse spatial composite(s) from one or more additional channel processor(s) to generate a representation of an originally transmitted signal (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

Magnuski teaches the weak link component (col. 3, lines 60-62, Magnuski).

- As per claim 33, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. teach the additional limitations.

Magnuski teaches that each of the channels is assigned to an independent carrier frequency, providing frequency diverse signals (col. 2, line 65-col. 3, line 5, col. 3, lines 60-73, Magnuski).

27. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Balachandran et al. (US 5,881,105), Schuster et al. (US 6,170,075 B1) and Chuang et al. (US 6,052,594) as applied to claim 29 above, and further in view of Chin et al. (US 6,694,155 B1).

As per claim 30, Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. substantially teach the claimed invention described in claim 29 (as rejected above). Altman et al. also teach that the subsequent channel processor processes the temporally diverse spatial composite signals (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

However Magnuski, Altman et al., Balachandran et al., Schuster et al. and Chuang et al. do not explicitly teach the specific use of utilization of maximal ratio combining, MRC.

Chin et al. in an analogous art teach that this approach, called maximal ratio combining (MRC) approach, is equivalent to keeping the main beam of the downlink beam pattern toward the intended user (col. 3, lines 2-5, Chin et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Chin et al. by including an additional step of using maximal ratio combining (MRC).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that utilizing maximal ratio combining (MRC) would provide the opportunity to keep the main beam of the downlink beam pattern toward the intended user and increase the signal strength.

28. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), as applied to claim 16 above, and further in view of Kyllonen (US 5,819,174).

As per claim 34, over Magnuski and Altman et al. substantially teach the claimed invention described in claim 16 (as rejected above). Altman et al. also teach wireless communication system and implementing one or more functions of the multidimensional diversity agent (col. 1, lines 11-15, Altman et al.).

However Magnuski and Altman et al. do not explicitly teach the specific use of control logic, to control one or more operational aspects of the element; and a memory device, coupled to the control logic, including a plurality of executable instructions which, when executed by the control logic implement one or more functions.

Kyllonen in an analogous art teaches a controller that is bidirectionally coupled to a memory and to the transceiver, the controller executing instructions for implementing a plurality of tasks, including an initialization task, a system access task, an idle task, and a response to an incoming call task (col. 6, lines 40-44, Kyllonen).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Kyllonen by including an additional step of using control logic, to control one or more operational aspects of the element; and a memory device, coupled to

the control logic, including a plurality of executable instructions which, when executed by the control logic implement one or more functions.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to automate the multidimensional diversity techniques and conduct the tasks faster and accurately for the wireless communications.

29. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970) in view of Altman et al. (US 3,195,049) and Tolopka et al. (US 6,044,349).

As per claim 35, Magnuski teaches an identified weak link component of a wireless communication link to generate a plurality of decorrelated signals in at least the weak link component, and to selectively combine received ones of the plurality of decorrelated signals which, when demodulated, provide a representation of content originally transmitted in the received signals (figure 3, col. 2, lines 13-21, col. 3, line 60-col. 4, line 17, Magnuski).

However Magnuski does not explicitly teach the specific use of a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains.

Altman et al. in an analogous art teach that this invention relates to radio diversity receiving systems and more particularly to space, frequency, time and angle diversity radio reception of angularly modulated carrier waves ....to obtain a single combined signal at baseband (col. 1, line 11-col. 2, line 2, Altman et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Altman et al. by including an additional step of using a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a multidimensional diversity, producing diversity in two or more of the space, time, and/or frequency domains would provide the opportunity to reduce signal fading at the receiving system.

Magnuski also does not explicitly teach the specific use of a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process.

However Tolopka et al. in an analogous art teach a machine readable storage medium having stored thereon machine executable instructions, wherein execution of the machine-executable instructions is to implement a method (col. 10, lines 36-39, Tolopka et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Tolopka et al. by including an additional step of using a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that using a machine accessible storage device comprising a plurality of executable instructions which, when executed by an accessing machine implement a process would provide the opportunity to automate the process and the process will be implemented faster and accurately.

30. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049) and Tolopka et al. (US 6,044,349) as applied to claim 35 above, and further in view of Soliman (US 2002/0114288 A1).

As per claim 36, Magnuski and Altman et al. and Tolopka et al. substantially teach the claimed invention described in claim 35 (as rejected above). Tolopka et al. also teach a machine accessible storage device further comprising instructions that are executed (col. 10, lines 36-39, Tolopka et al.).

However Magnuski and Altman et al. and Tolopka et al. do not explicitly teach the specific use of monitoring one or more operational characteristics of the wireless communication link for an indication of weakness in one or more of the link components

Soliman in an analogous art teaches that this invention relates to digital wireless communication systems, and more particularly to methods for detecting forward and reverse link imbalances in digital wireless communications systems (page 1, paragraph 2, Soliman).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Soliman by including an additional step of monitoring one or more operational characteristics of the wireless communication link for an indication of weakness in one or more of the link components.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that monitoring one or more operational characteristics of the wireless communication link for an indication of weakness in one or more of the link components would provide the opportunity to determine the weak link in the wireless communication system and to implement techniques to improve data rate of the wireless communication system.

31. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Tolopka et al. (US 6,044,349) and Soliman (US 2002/0114288 A1) as applied to claim 36 above, and further in view of Molloy et al. (US 6,591,382 B1) and Agrawal et al. (US 5,722,051).

As per claim 37, Magnuski, Altman et al., Tolopka et al. and Soliman substantially teach the claimed invention described in claim 36 (as rejected above). Soliman also teaches a receive signal strength (page 1, paragraph 5, page 3, paragraph 24, page 4, paragraph 29, Soliman) and a signal to noise ratio (SNR), (page 7, paragraphs 63, 66, Soliman).

However Magnuski, Altman et al., Tolopka et al. and Soliman do not explicitly teach the specific use of monitoring a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

Molloy et al. in an analogous art teach that during data communications, a quality of service monitor constantly monitors the signal quality, via a signal quality indicator (col. 3, lines 7-9, Molloy et al.). Molloy et al. teach that the quality indicator is used to track the bit error rate of data transmissions (col. 9, lines 11-12, Molloy et al.). Molloy et al. teach Signal-to-Noise-and-Interference-Ratio, SINR (col. 9, lines 33-34, Molloy et al.). Molloy et al. teach that if the measured FER is much larger than a projected FER based on the average signal level, then interference is probably present (col. 9, lines 60-63, Molloy et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Molloy et al. by including an additional step of monitoring a bit error rate (BER), a frame error rate (FER) and signal to noise and interference ratio (SINR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

Magnuski, Altman et al., Tolopka et al. and Soliman also do not explicitly teach specifically a carrier to interference ratio (CIR).

However Agrawal et al. in an analogous art teach that the quality of service may be defined in terms of any of several parameters such as, for example, carrier-to-interference ratio (col. 5, lines 32-34, Agrawal et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Agrawal et al. by including an additional step of using a carrier to interference ratio (CIR).

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that it would provide the opportunity to determine the signal quality and implement techniques to improve the signal quality.

32. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), and Tolopka et al. (US 6,044,349) as applied to claim 35 above, and further in view of Schuster et al. (US 6,170,075 B1).

As per claim 38, Magnuski, Altman et al., and Tolopka et al. substantially teach the claimed invention described in claim 35 (as rejected above).

Magnuski also teaches the weak link component and the diversity agent, transmitter and introducing temporally diverse signals (transmitter in figure 1, col. 3, lines 60-70, Magnuski). Tolopka et al. teach an executing machine to issue an instruction (col. 10, lines 36-39, Tolopka et al.).

However Magnuski, Altman et al., and Tolopka et al. do not explicitly teach the specific use of invoking repetition coding.

Schuster et al. in an analogous art teach that these mechanisms may involve adding redundant information to the data stream in an effort to enable a receiving end to reconstruct lost data. This process is commonly employed in wireless communications and is referred to as "channel coding". One of the simplest examples of a channel coder is a repetition coder, which calls for sending duplicates of each packet as a redundant packet (col. 4, lines 20-26, Schuster et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Schuster et al. by including an additional step of invoking repetition coding.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that invoking repetition coding would provide the opportunity to improve the data rate over the wireless channel.

- As per claim 39, Magnuski, Altman et al., Tolopka et al. and Schuster et al. teach the additional limitations.

Altman et al. teach the diversity agent and to combine spatially diverse signals to generate a spatial composite within each channel and to combine the spatial composites for each temporally diverse channel to generate a representation of the originally transmitted signal (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

Magnuski teaches the weak link component (col. 1, lines 29-32, Magnuski).

33. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Magnuski (US 3,361,970), Altman et al. (US 3,195,049), Tolopka et al. (US 6,044,349) and Schuster et al. (US 6,170,075 B1) as applied to claim 39 above, and further in view of Balachandran et al. (US 5,881,105).

As per claim 40, Magnuski, Altman et al., Tolopka et al. and Schuster et al. substantially teach the claimed invention described in claim 39 (as rejected above). Altman et al. teach the diversity agent, combining the spatial composites and demodulated spatial composites associated with the temporally diverse channels (figure 1, col. 4, line 51-col. 7, line 70, Altman et al.).

However Magnuski, Altman et al., Tolopka et al. and Schuster et al. do not explicitly teach the specific use of an error check failure.

Balachandran et al. in an analogous art teach that the CRC block encoding check does not match, i.e. the parity of the transmitted CRC bits does not correspond with that of the generated CRC (col. 10, lines 8-10, Balachandran et al.). Balachandran et al. teach that if the CRC block encoding check does not match, this indicates that the message is invalid (col. 10, lines 29-30, Balachandran et al.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Magnuski's patent with the teachings of Balachandran et al. by including an additional step of use of an error check failure.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of an error check failure would provide the opportunity to implement techniques to retransmit the signal if the error check fails, so that it is received correctly at the receiver.

34. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dipakkumar Gandhi whose telephone number is 703-305-7853. The examiner can normally be reached on 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dipakkumar Gandhi
Patent Examiner

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PRIMARY EXAMINER